

# **EXHIBIT 15**

**Exhibit No. 15**

**Infringement Claim Chart of U.S. Patent No. 8,605,361 by Optotune and Edmund Optics<sup>1</sup>**

Accused products including Optotune's liquid focus tunable lenses based on manual actuation (including ML-20-37) and Edmund Optics' liquid lens products that integrate Optotune's manually actuated liquid focus tunable lenses (including Optotune Focus Tunable Lens) (the "Accused Products") infringe each element of the Asserted Claims of U.S. Patent No. 8,605,361 (the "'361 Patent"). Further, Optotune AG and Edmund Optics instruct their customers regarding the use of the Accused Products to enable the use of the features identified throughout this chart. Optotune AG and Edmund Optics intend and instruct that their customers use these features in a manner that practices each element of the Asserted Claims. Plaintiff contends each of the following limitations is met literally, and, to the extent a limitation is not met literally, it is met under the doctrine of equivalents.

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<sup>1</sup> This claim chart is based on the information currently available to Plaintiff and is intended to be exemplary in nature. Plaintiff reserves all rights to update and elaborate their infringement positions, including as Plaintiff obtains additional information during the course of discovery.

Claim	Accused Products
[1Pre] A fluidic optical device, comprising:	<p data-bbox="583 297 1136 326">The Accused Products meet this limitation.</p> <p data-bbox="583 367 1906 436">The Optotune ML-20-37 includes a fluidic a fluidic lens device (i.e. manually tunable lens ML-20-37 with optical fluid).</p> <p data-bbox="835 483 1192 526"><b><u>Working principle</u></b></p> <p data-bbox="835 574 1661 938"><u>Optotune's focus tunable lenses are shape-changing lenses based on a combination of optical fluids and a polymer membrane. The core element consists of a container, which is filled with an optical liquid and sealed off with a thin, elastic polymer membrane. A circular ring that pushes onto the center of the membrane shapes the tunable lens. The deflection of the membrane and with that the radius of the lens can be changed by pushing the ring towards the membrane, by exerting a pressure to the outer part of the membrane or by pumping liquid into or out of the container.</u></p> <p data-bbox="583 992 1037 1021">Optotune Focus tunable lenses at 1.</p>

The curvature of the lens can be manually changed from convex to flat to concave by rotating the outer ring attached to the lens. The focal length is accordingly tuned to a desired value.

The following table gives the specification of our standard manual lens. Lens aperture, thickness and tuning range can be adapted in the framework of a customization project.

#### Mechanical specifications

Optical aperture <sup>1</sup>	20	mm
External diameter	37 (39 including gears)	mm
Thickness	13.2 (without adapter), 18.6 (with adapter)	mm
Weight	13.7 (without adapter) / 25.2 (with adapter)	g
Max torque	80 (at gear teeth)	mNm
Full tuning angle	337	°

Optotune ML-20-37-Series Spec Sheet at 1.

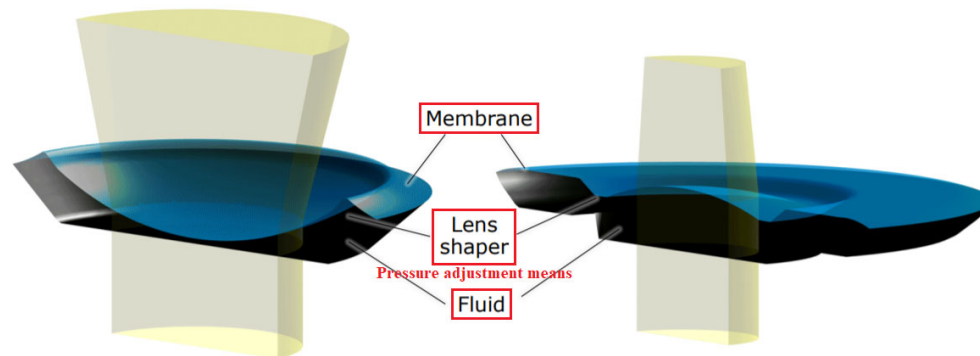
#### Working principle based on membrane and fluid



Mechanically tunable lens



Electrically tunable lens

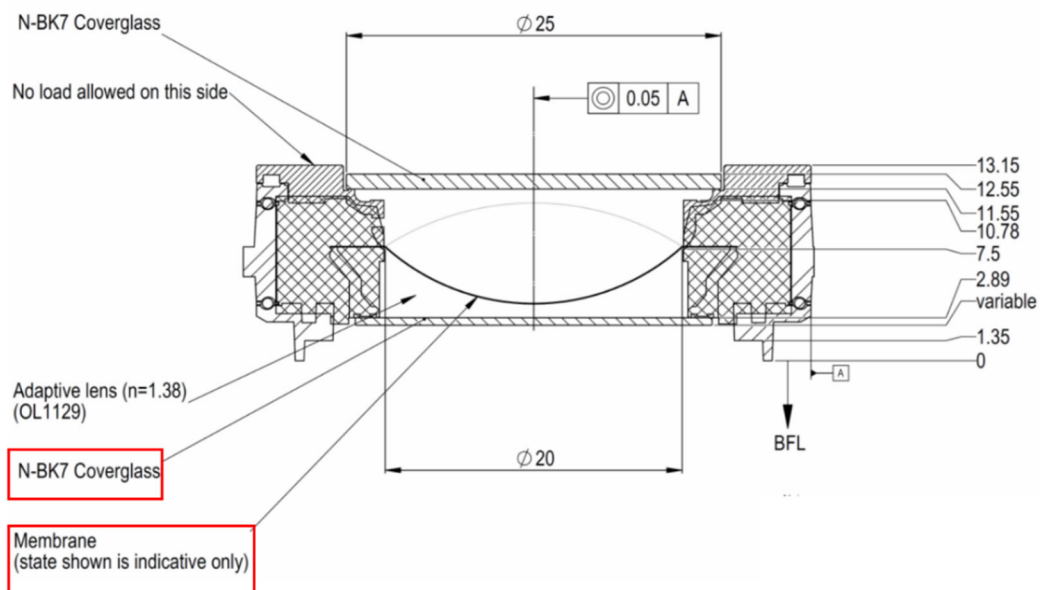


Optotune focus-tunable lenses for machine vision at 3.

[1A] a first optical surface that includes an deformable material;

The Accused Products meet this limitation.

The Optotune ML-20-37 includes a membrane (i.e., first optical surface) that is made of an elastic polymer (i.e., deformable material).

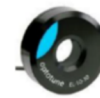


Optotune ML-20-37-Series Spec Sheet at 4.

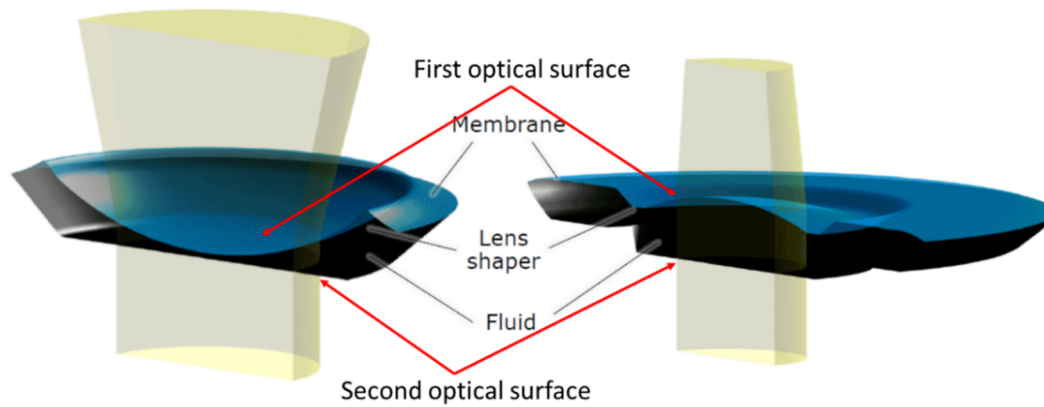
## Working principle based on membrane and fluid



**Mechanically tunable lens**

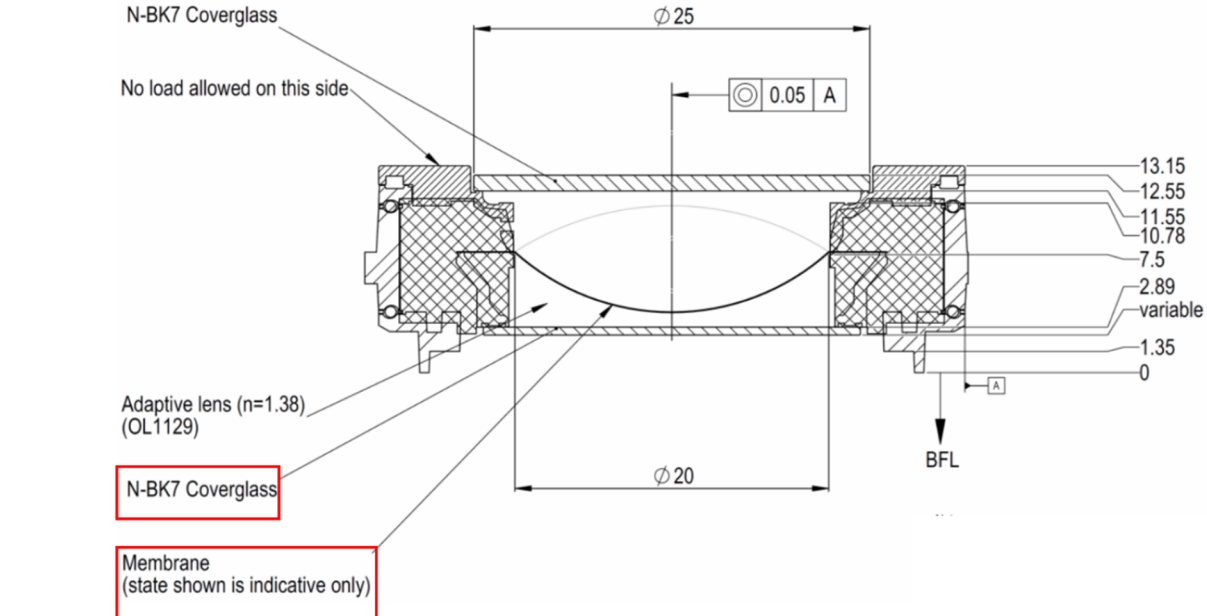


**Electrically tunable lens**

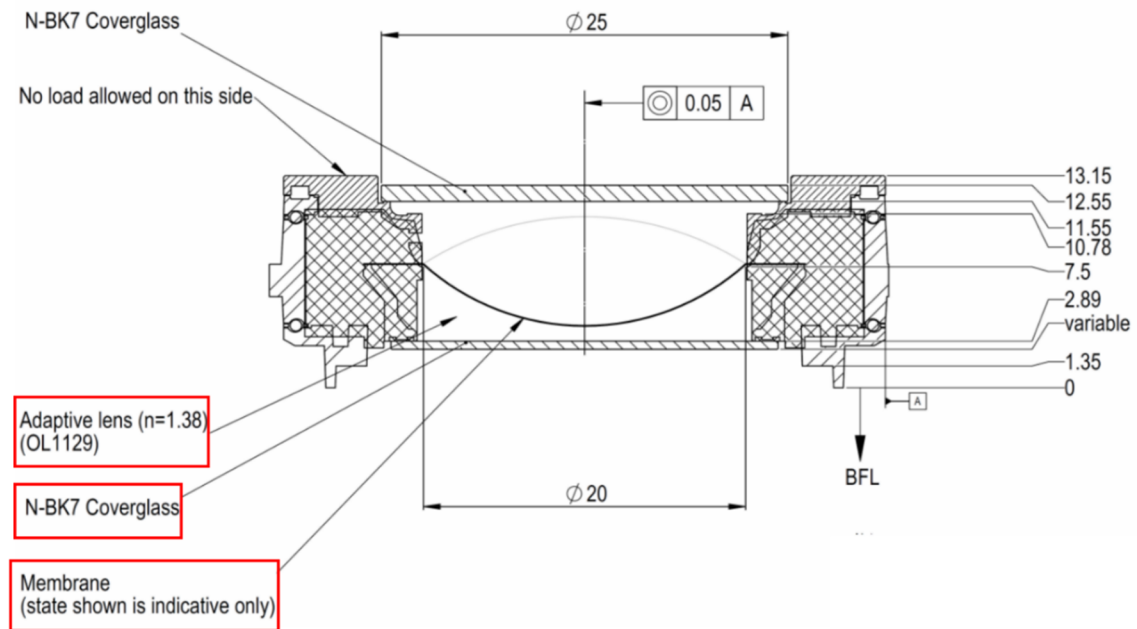


Optotune focus-tunable lenses for machine vision at 3.

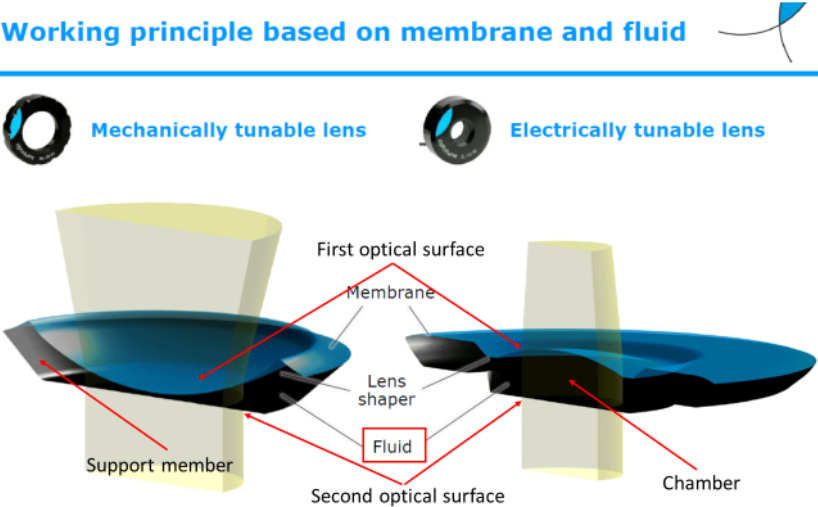

	<p><b>Working Principle of Focus Tunable Lenses</b></p> <p><u>The manually tunable lenses for LED lighting from Optotune are shape-changing lenses. The core of the lens consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane.</u> Through an inclination in the housing, this container is pressed against a ring or so-called "lens shaper". This causes a rise in liquid pressure in the container and hence, a spherical lens to form. This changes the focal length to shorter values (figure 1). The clear aperture as well as the position of the lens shaper remains constant throughout the whole tuning range. Therefore, no efficiency is lost when tuning from the wide flood angle to the small spot. This technology is both very efficient and compact and allows a flexible adjustment of the beam angle when implemented in a spot light. Turning a ring controls the movement of the lens shaper into the liquid filled</p> <p>Focus Tunable Lenses for LED Lighting by Optotune AG at 2-3.</p>
[1B] a second optical surface that includes a rigid material;	<p>The Accused Products meet this limitation.</p> <p>The Optotune ML-20-37 includes a cover glass (i.e., second optical surface) that is made of BK7 glass (i.e., rigid material).</p>

	 <p>N-BK7 Coverglass</p> <p>No load allowed on this side</p> <p>Adaptive lens (n=1.38) (OL1129)</p> <p>N-BK7 Coverglass</p> <p>Membrane (state shown is indicative only)</p> <p>13.15 12.55 11.55 10.78 7.5 2.89 variable 1.35 0</p> <p>BFL</p> <p>0.05 A</p> <p>25 20</p> <p>Optotune ML-20-37-Series Spec Sheet at 4.</p>
<p>[1C] an optical fluid disposed between first and second optical surfaces;</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune ML-20-37 includes an optical fluid (also referred to as adaptive lens) disposed between the first optical surface (i.e., membrane) and the second optical surface (i.e., cover glass).</p>





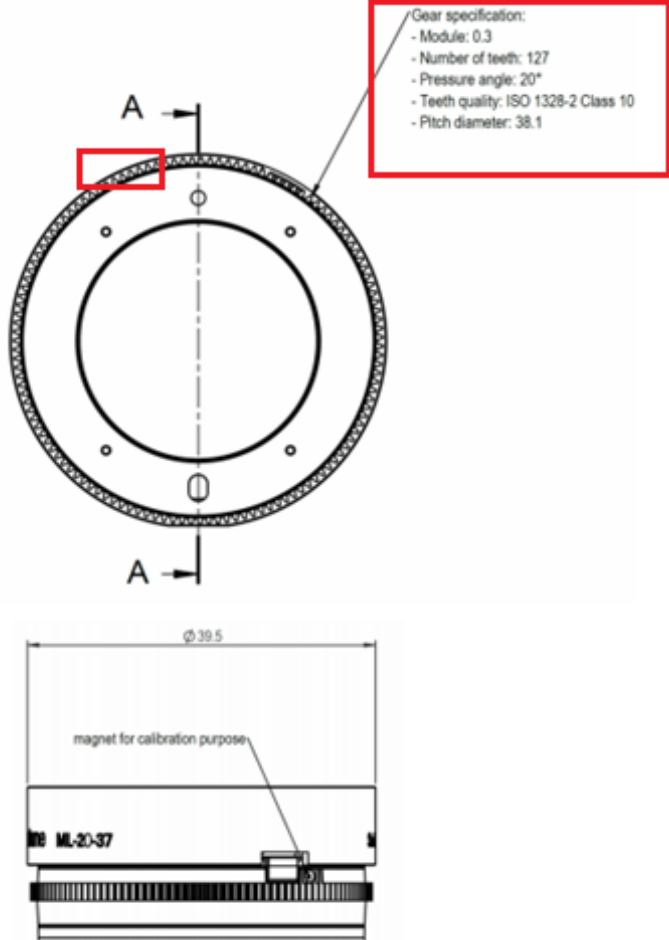
Optotune ML-20-37-Series Spec Sheet at 4.

	<p style="text-align: center;"><b>Working principle based on membrane and fluid</b></p>  <p>Optotune focus-tunable lenses for machine vision at 3.</p>
<p>[1D] and an actuator disposed in communication with first optical surface;</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune ML-20-37 includes a rotatable outer ring (i.e., actuator) configured to press the membrane (i.e., first optical surface) so as to change the focal power of the lens.</p> <p style="text-align: center;"><b>Manually Tunable Lens ML-20-37</b></p>  <p><u>The curvature of the lens can be manually changed from convex to flat to concave by rotating the outer ring attached to the lens. The focal length is accordingly tuned to a desired value.</u></p> <p>Optotune ML-20-37-Series Spec Sheet at 1.</p>

### **Working principle**

Optotune's focus tunable lenses are shape-changing lenses based on a combination of optical fluids and a polymer membrane. The core element consists of a container, which is filled with an optical liquid and sealed off with a thin, elastic polymer membrane. A circular ring that pushes onto the center of the membrane shapes the tunable lens. The deflection of the membrane and with that the radius of the lens can be changed by pushing the ring towards the membrane, by exerting a pressure to the outer part of the membrane or by pumping liquid into or out of the container.

Optotune Focus tunable lenses at 1.

	 <p>Gear specification:</p> <ul style="list-style-type: none"> <li>- Module: 0.3</li> <li>- Number of teeth: 127</li> <li>- Pressure angle: 20°</li> <li>- Teeth quality: ISO 1328-2 Class 10</li> <li>- Pitch diameter: 38.1</li> </ul> <p>Optotune ML-20-37-Series Spec Sheet at 2.</p>
<p>[1E] wherein activation of actuator results in a deformation of first optical surface and displacement of optical fluid, wherein</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune ML-20-37 includes a rotatable outer ring configured to apply an actuation force at the outer portion of the membrane (i.e., first optical surface). The actuation force displaces the optical fluid and deforms the central portion of the membrane (i.e., first optical surface). The deformation of the</p>

deformation of first optical surface and displacement of optical fluid result in a change in an optical property of the device.

membrane and the displacement of the optical fluid result in a change in the focal power (i.e., optical property) of ML-20-37.

### Manually Tunable Lens ML-20-37



The curvature of the lens can be manually changed from convex to flat to concave by rotating the outer ring attached to the lens. The focal length is accordingly tuned to a desired value.

Optotune ML-20-37-Series Spec Sheet at 1.

### Working principle

Optotune's focus tunable lenses are shape-changing lenses based on a combination of optical fluids and a polymer membrane. The core element consists of a container, which is filled with an optical liquid and sealed off with a thin, elastic polymer membrane. A circular ring that pushes onto the center of the membrane shapes the tunable lens. The deflection of the membrane and with that the radius of the lens can be changed by pushing the ring towards the membrane, by exerting a pressure to the outer part of the membrane or by pumping liquid into or out of the container.

Optotune Focus tunable lenses at 1.

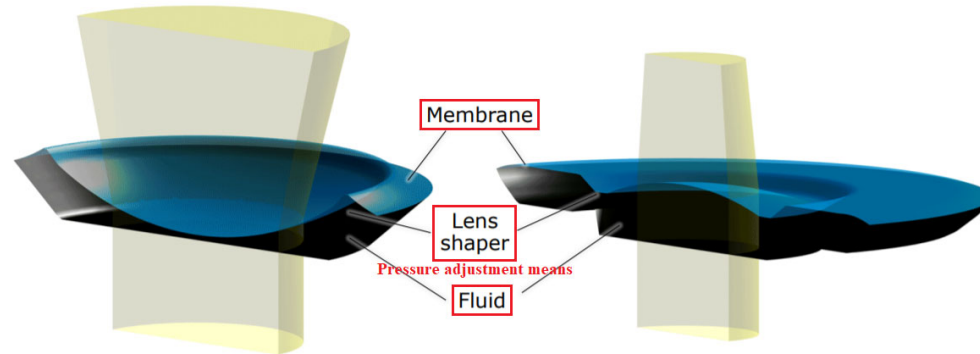
### Working principle based on membrane and fluid



Mechanically tunable lens



Electrically tunable lens



Optotune focus-tunable lenses for machine vision at 3.

The ML-20-37 manually **tunable lens** is designed to have its lens curvature change between convex (+18 dpt), flat (0 dpt), and concave (-18 dpt) through rotation of the outer adjustment ring. This allows for the focal length of the lens to be tuned to the precise value required for an optical application.

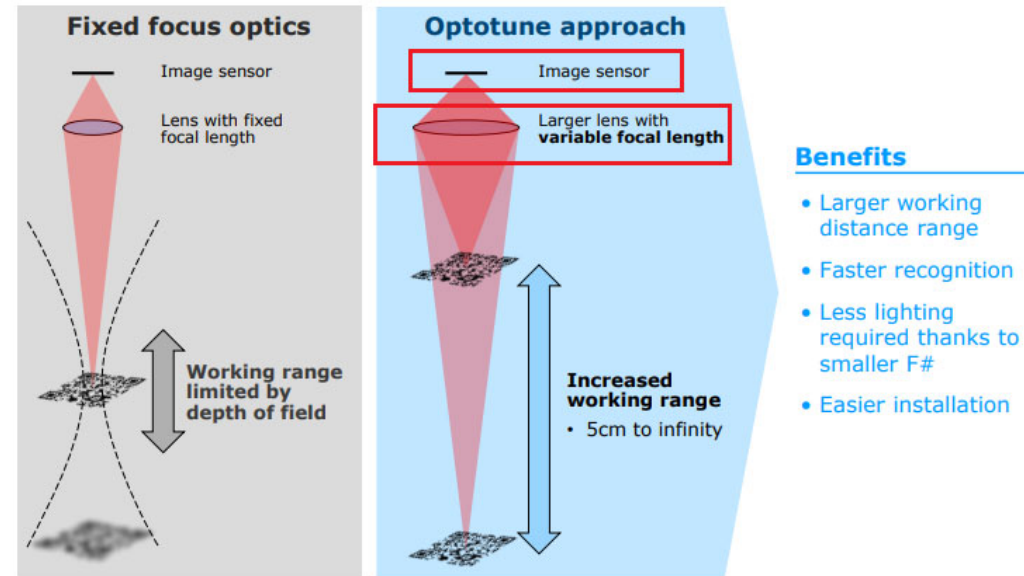
Optotune Introduces Manually Tunable Lens at 1.

[18Pre] A fluidic optical device, comprising:

The Accused Products meet this limitation. *See claim 1Pre supra.*

[18A] a first optical surface that includes an elastic material;	The Accused Products meet this limitation. <i>See</i> claim 1A <i>supra</i> .
[18B] a second optical surface that includes a rigid material;	The Accused Products meet this limitation. <i>See</i> claim 1B <i>supra</i> .
[18C] an optical fluid disposed between first and second optical surfaces;	The Accused Products meet this limitation. <i>See</i> claim 1C <i>supra</i> .
[18D] an actuator disposed in communication with first optical surface;	The Accused Products meet this limitation. <i>See</i> claim 1D <i>supra</i> .
[18E] wherein activation of actuator results in an elastic deformation of first optical surface and displacement of optical fluid; wherein deformation of first optical surface and displacement of optical fluid result in a change in an optical property of the device; and	The Accused Products meet this limitation. <i>See</i> claim 1E <i>supra</i> .
[18F] an image sensor configured to receive light transmitted through said first and second optical surfaces and optical fluid.	<p>The Accused Products meet this limitation.</p> <p>The Optotune ML-20-37 can include an image sensor (e.g., camera) to offer a natural focusing solution or applications in ophthalmology, in which incident is transmitted through the first optical surface (i.e., membrane), second optical surface (i.e., cover glass), and the optical fluid to form an image on the image sensor.</p>

## Tunable lenses offer a natural focusing solution



Optotune focus-tunable lenses for machine vision at 4.



## Ophthalmology

Whether measuring the refractive power of the eye, scanning the retina and the anterior eye segment or taking a fundus image - Optotune's components are used in a range of ophthalmic instruments.

Main benefits:

- Most compact way to correct refraction
- Continuous adjustment in real-time
- +/- 20 diopters spherical, +/- 8 diopters cylindrical (Stokes approach)
- Large clear aperture



Fundus camera

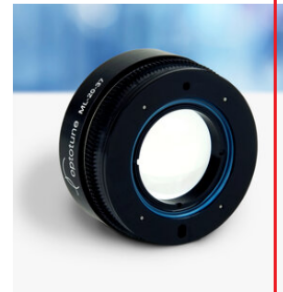
### Products: ophthalmology



EL-16-40-TC



EL-10-30-TC



ML 20-37



MR 15-30

Optotune Applications – Ophthalmology at 1.

	<div><b>Applications</b><p>Optotune's ML-20-37 is the ideal choice for:</p><ul style="list-style-type: none"><li>• Ophthalmology</li><li>• LED illumination</li><li>• Optics R&amp;D (e.g. beam expander)</li><li>• Education</li></ul></div> <p>Optotune Products – ML-20-37 at 1.</p>
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